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# The method of reducing dissimilar space images to the single reference system

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## Abstract

© 2018, International Multidisciplinary Scientific Geoconference. All rights reserved. The present paper focuses on describing the method of bringing dynamic space images of various celestial objects to the uniform reference system. This approach is designed to analyze coordinate and time parameters of cosmic bodies in various phase spaces. Based on this method, images of the Moon and stellar areas obtained with CCD-matrixes were studied. As a result, reducing the images to the single system achieved the accuracy between 0.05 and 0.11 arc seconds by declination and between 0.04 and 0.13 arc seconds by right ascension. The work also contains practical results on the analysis of the system of images whose coordinate systems are in various phase spaces. On the basis of this absolute method, one may transform coordinates of the objects studied into the inertial coordinate system with an accuracy sufficient for astrometric measurements. The results of the present work are of great importance in the fields of space astrometry and geodesy. Positional observations of a space object (e.g. the surface of the Moon) could be taken using 3 methods: 1) Getting an image of only studied objects without synchronized coordinate binding to a stellar field; 2) CCD-camera binding to a system of stars; 3) Taking observations of a space object with photographing it against a background of weaker stars. According to the difference of reference stars' coordinates, the observed value minus the calculated value (O-C) binding quality of the lunar image to the star image was determined. Similar differences are calculated by the analysis of digital maps. As a result, it was determined that, on average, the value of (O-C) is 0.04 ± 0.13 arc seconds by right ascension and is 0.05 ± 0.11 arc seconds by declination. Thus, it may be concluded that binding of the system of two images using marks is carried out with sufficient accuracy.

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## Keywords

Lunar observations, Reference coordinate, Selenocentric dynamic systems, Software

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